478

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

106° 30' 27'30" 25' 22'30" 20' 17'30"

T. 33 N.
T. 32 N.
42° 45'
42° 30"
T. 32 N.
T. 31 N.

FROM AERIAL PHOTOS

C A S P E R M O U N T A I N

CASPER MOUNTAIN

Goose Egg Draw
Coal Mine Canyon
Coal Mountain
Dry Lakes
CASPER
BRIDGE
MEADOW
BOW

Eadsville
Spring
Radio Towers
Dam
BEARTRAP MEADOW
COUNTY PARK

Qa	Qt	Holocene	QUATERNARY
Qg			
Kc	Kf	Upper Cretaceous	

Unconformity

Km		CRETACEOUS
Kt	Lower Cretaceous	
Kc		
Jm	Upper Jurassic	JURASSIC
Js	Upper and Middle Jurassic	
RP		TRIASSIC
Ra		
RJ		
P Pc		PERMIAN AND PENNSYLVANIAN
Mm	Upper and Lower Mississippian	MISSISSIPPIAN
€		CAMBRIAN

Angular Unconformity

Yd			PROTEROZOIC Y(?)
Ahd			ARCHEAN(?)
Aam	Aqv	Af	ARCHEAN
Ag	Agp	Ap	
Agr	Agn		
Au	Asp	Acs	
Abg	Abs		
Aq			

Order does not necessarily indicate age sequence

DESCRIPTION OF MAP UNITS

SEDIMENTARY ROCKS

Qa ALLUVIAL DEPOSITS (HOLOCENE)--Unconsolidated, poorly sorted silt, sand, gravel, and boulders mainly in valley bottoms

Qt TALUS DEPOSITS (HOLOCENE)--Debris consisting of angular clasts to as much as several tens of meters across. These deposits occur mostly on or at the base of north-facing steep slopes

Qg GRAVELS (QUATERNARY?)--Subrounded to rounded rock fragments consisting of sandstone, quartzite, amphibolite, granite, white quartz pegmatite and yellow and orange-red chert; occurs in association with finer-grained sandy soil. Forms a single deposit in the southeast corner of Sec. 8, R. 79 W.

Kc COODY SHALE (UPPER CRETACEOUS)--Dark-gray marine shale

Kf FRONTIER FORMATION (UPPER CRETACEOUS)--Interbedded sandstone and shale with some bentonite; deltaic marine in origin

Km MOWRY SHALE (LOWER CRETACEOUS)--Silvery siliceous shale, some bentonite, usually forms tree-covered ridges; of marine origin

Kt THERMOPOLIS SHALE (LOWER CRETACEOUS)--Includes a gray muddy sandstone (upper part), and black, soft, fissile shale (lower part); of marine origin

Kl CLOVERLY FORMATION (LOWER CRETACEOUS)--Conglomerate of fluviatile origin

Jm MORRISON FORMATION (UPPER JURASSIC)--Variegated shale, sandstone and limestone

Js SUNDANCE FORMATION (UPPER AND MIDDLE JURASSIC)--Green-gray shale and sandstone with some gypsum; of marine origin

Trp RED PEAK FORMATION (TRIASSIC)--A red shale, siltstone, and sandstone unit formed in a restricted marine basin

Ta ALCOVA FORMATION (TRIASSIC)--Where mapped, a thin marine algal limestone

Rj JELM FORMATION (TRIASSIC)--Orange-red siltstone formed on a tidal flat

PPc CASPER FORMATION (PERMIAN AND PENNSYLVANIAN)--A dolomitic to sandy cross-bedded sandstone that occurs on the crest of ridges along the northern flank of Casper mountain and on the gentle sloping south flank. Fossils locally abundant in dolomitic unit

Mm MADISON LIMESTONE (MISSISSIPPIAN)--A very thick bedded limestone unit; locally fossiliferous

€ FLATHEAD SANDSTONE (CAMBRIAN)--Planar to cross bedded sandstone with a conglomeratic basal part

ANGULAR UNCONFORMITY

INTRUSIVE ROCKS

Yd DIABASE DIKES (PROTEROZOIC Y?)--A fine- to medium-grained, dark-gray to nearly black dike rock that weathers a yellowish-brown to moderate-brown in color. The dikes are as much as 30 m wide and 4 km long. The diabase has subophitic to opnitic texture. Phenocrysts of pyroxene and zoned plagioclase occur in a fine-grained matrix consisting of plagioclase, uralite, epidote, and magnetite. Some dikes have 2-3 percent quartz. Age uncertain

Ahd HORNBLENDITE AND HORNBLENDE DIORITE (ARCHEAN?)--Hornblendite is a massive, fine- to medium-grained, black rock consisting of the mineral hornblende and traces of zircon, ores, and sometimes traces of quartz and plagioclase.

Hornblende diorite is a massive or weakly foliated black and white mottled, medium- to coarse-grained rock. Both occur in pods or lenses as much as 500 m in length. Hornblende, the chief mineral in both rock types varies in color from olive green to blue green. The hornblende in hornblende diorite is often poikilitic and may have overgrowths of cummingtonite. In the diorite, plagioclase, is nearly as abundant as hornblende; it is complexly twinned, however, Carlsbad and Albite twin combinations predominate. Quartz occurs in the diorite in varying amounts from a trace to several percent. Accessory minerals include sphene, biotite, apatite and the ore minerals magnetite and hematite. Often younger coarse quartz and granitic veins, white or pink in color, and perhaps related to the felsic dikes (Af), cut these dark pods and lenses sometimes producing an angular breccia of the dark rock as the lighter magma moved into place

Aam AMPHIBOLITE (ARCHEAN)--A greenish-gray, black or black and white or pink mottled, fine- to medium-grained rock with a good, fair, or weak foliation. Amphibolite predominantly occurs in conformable stubby lenses along the regional foliation up to several tens of meters long and several meters wide. Quartz and traces of biotite occur in the foliated amphibolite. Some amphibolite is cross-cutting but it is believed all is of igneous origin. There are at least two generations of amphibolite, an older that is foliated and even locally schistose and a younger, less altered and less foliated or non-foliated amphibolite

Aqv QUARTZ VEINS (ARCHEAN)--This persistent quartz veins approximately 5 cm in width cut gneissic granite and contain gneissic granite stringers. Quartz veins contain abundant red hematitic feldspar bands. Veins appear to parallel foliation trends

Af FELSIC DIKES (ARCHEAN)--A fine- to medium-grained, bright pink felsic rock that forms several discontinuous ridges in section 11, township 32 N., R. 79 W. Plagioclase and microcline predominant, with 20 percent or more of quartz and traces of apatite, allanite, epidote, ores and chlorite

GRANITE, GRANITE GNEISS AND PEGMATITE, AND PEGMATITE (ARCHEAN)--

Agn Granite (Ag), granite gneiss and pegmatite (Agp), and pegmatite (Ap) appear to be related and are spatially associated with the map unit biotitic-quartz feldspar gneiss in the west central part of the map area. In hand specimen the granitic rocks are similar to but bear more muscovite than the granite of the Granite Mountains to the west of Casper Mountain. Dark-bluish-gray, almost black, microcline phenocrysts are typical of the pegmatites as well as some of the granite gneiss on Casper Mountain and some of the granites in the Granite Mountains. A pegmatite biotite K-Ar and Rb-Sr age of 2,400 m.y. (Peterman and Hildreth, 1978) is believed to be from this Casper Mountain unit

Ag Granite--A leucocratic, buff- to light-gray or white, medium- to very coarse grained, nonfoliated, muscovite-bearing granite with traces of biotite and magnetite and completely lacking in other accessory minerals. The granite may contain anywhere from 4 to 15 percent muscovite and the muscovite flakes tend to glisten on freshly broken rock surfaces

Agp Granite gneiss and pegmatite--A light-gray, medium-grained, foliated paragneiss, with more than 15 percent biotite and traces of garnet and andalusite. Pegmatite in the granite gneiss is a medium- to coarse-grained leucocratic rock that generally occurs in unmappably small lenses and stringers. Accessories include apatite, zircon, monazite, and ores

Ap Pegmatite--A very coarse grained, white rock consisting of quartz, microcline and plagioclase as well as abundant muscovite, some biotite and clots of tremolite-actinolite, and trace amounts of beryl, apatite, and magnetite altered to hematite. Forms large masses in the Hogadon Ski area between Wolf and Garden Creeks

GRANITE AND GNEISSIC GRANITE (ARCHEAN)--

Agr Granite--A two-mica granite. A very coarse grained non-foliated pink rock mottled reddish and or grayish-black. Borders are finer grained, less pink and a slight foliation is defined by thin biotite stringers. Plagioclase, microcline and quartz occur in approximately equal amounts; biotite and muscovite make up between one and six percent of the rock. Monazite or xenotime, apatite, and the ore minerals magnetite and hematite tend to cluster with the biotite. Local cataclasis along borders between plagioclase and quartz crystals

Agn Gneissic granite--Gneissic granite is a biotitic, microcline, plagioclase, quartz-bearing rock, generally pinkish in color that varies from a very coarse granitic-looking rock to a medium-grained reddish-brown foliated gneissic rock. The foliation is defined chiefly by stringers of biotite and inclusions of biotite-quartz-plagioclase gneiss and biotitic quartz-feldspar gneiss. Intensity of color depends on the type and number of inclusions of gneiss and amphibolite. Biotite generally averages less than 5 percent of the rock and is greatly altered to chlorite and or epidote. Accessory minerals include the iron oxides magnetite and hematite, apatite, zircon, monazite or xenotime, tourmaline and the secondary mineral sphene. Most thin sections exhibit some form of cataclasis including serriate quartz, shearing between microcline and plagioclase grains and crushed quartz in veins cutting across all grain boundaries. Over-print pattern represents areas of numerous biotitic-quartz-feldspar and biotite-quartz-plagioclase gneiss inclusions too small to map separately

ULTRAMAFIC ROCKS (ARCHEAN)--Dense fine- to coarse-grained, black, greenish-black or dark-brown rocks that weather brown, light gray or yellowish-green. Lens, layers and clots which except for serpentinite rarely exceed 450 m in length or 100 m in width. Age is uncertain, however, the schistose ultramafic rocks are folded and therefore older than the major folding of Precambrian rocks 2.7-2.8 b.y. ago (Peterman and Hildreth, 1978)

Au Ultramafic rocks--Dark-greenish-gray to black or brownish-black rocks and fine- to coarse-grained and less altered than the serpentinites. May be the same age as the serpentinites or younger. Found in lens, layers, or clots generally in or adjacent to serpentinite. Consists of various assemblages of the following minerals: anthophyllite, antigorite, chlorite, augite-ferrogedrite-hornblende, tremolite, actinolite, grunerite, cummingtonite, hypersthene, clinochrysotile, lizardite, diopside and garnet. Magnetite is ubiquitous and olivine remanents are present locally

Asp Serpentinite--Black dense rock that alters a greenish-black or a greenish-gray in color with abundant hair-like veins largely of magnetite giving the rock a crude foliation. Weathered surfaces are a light-gray or brownish-gray in color. X-ray diffraction identifies the minerals antigorite, clinochrysotile and lizardite

Acs Chromite schist--Gray to greenish-gray, fine- to medium grained often acicular schistose ultramafic rock found on the east flank of the ultramafic area. Schist may contain dense dark layers or lens rich in chromite and magnetite. Layers in schist vary from chromite-magnetite-talc-chlorite to talc-anthophyllite-chlorite-actinolite-tremolite to chromite-magnetite-antigorite-chlorite, or anthophyllite-tremolite/actinolite-chlorite-magnetite-chromite. Rock is microfolded, nearly every thin section displays strain

METASEDIMENTARY ROCKS

Abg/Abs BIOTITE-QUARTZ-PLAGIOCLASE GNEISS (ARCHEAN)--A fine-to medium-grained, light- to medium-gray strongly foliated gneiss (Abg). Its modal composition is approximately 20 percent biotite, 25 percent quartz and 55 percent plagioclase. Scattered throughout the gneiss areas are lens and layers of fine-grained, dark, strongly foliated, biotite, hornblende and anthophyllite schist (Abs). Hornblende schist was only seen adjacent to and west of Wolf Creek, anthophyllite schist east of West Fork Garden Creek while biotite schist is scattered throughout the area. Biotite schist may also be locally cordierite or garnet-bearing

Aqf BIOTITE PLAGIOCLASE-MICROCLINE-QUARTZ GNEISS (ARCHEAN)--A fine- to medium-grained, light-gray or tan, strongly foliated locally banded gneiss containing generally less than 5 percent but as much as 15 percent biotite, 10-35 percent microcline, 15-20 percent plagioclase, 25-50 percent quartz and exceptionally 1-6 percent cordierite. Accessories include magnetite, apatite, sphene and zircon. On both flanks of Casper Mountain the gneiss is commonly migmatitic and is the major rock type within the gneissic granite unit displaying all phases of assimilation by the granite. Biotite-plagioclase-microcline-quartz gneiss is commonly interlayered with biotite-quartz-plagioclase gneiss and quartzite; contacts may be gradational. Adjacent to ultramafic rocks the unit contains intrusive lens and layers of banded and schistose ultramafic amphibolite

Aq IMPURE QUARTZITE (ARCHEAN)--A fine- to medium-grained, conspicuously foliated, layered gray, black or reddish-brown rock consisting essentially of quartz but in the darker banded layers some mica, hornblende, cummingtonite and actinolite. Magnetite-hematite and actinolite when present emphasize foliation in the rocks. Accessory minerals include microcline, tourmaline, monazite-xenotime, apatite; alteration minerals include the chrome mica fuchsite, epidote, chlorite and sericite

CONTACT--Dashed where approximately located; dotted where inferred or concealed

FAULT OR FRACTURE ZONE--Dashed where approximately located; dotted where concealed; queried where inferred

FAULT INTERPRETED FROM AERIAL PHOTOS

THRUST FAULT--Dotted where concealed; sawteeth on upper plate

SHEARED ZONE

SYNFORM--Showing approximate trace of axial plane, and direction of plunge of axis. Dashed where inferred

BEARING AND PLUNGE OF AXIS OF MINOR FOLD--Symbol diagrammatically represents fold pattern

STRIKE AND DIP OF FOLIATION OR COMPOSITIONAL LAYERING--

Compositional layering generally parallel to foliation

Inclined

Vertical

BEARING AND PLUNGE OF LINEATION--Lineations formed by mineral alinement, axes of small folds, crenulations and crinkles. Symbol may be combined with foliation symbol

DIATREME--Amphibolitized peridotite pipe

REFERENCE

Peterman, Z. E., Hildreth, R. A., 1978, Reconnaissance geology and geochronology of the Precambrian of the Granite Mountains, Wyoming: U.S. Geological Survey Professional Paper 1055, 22 p.

BASE FROM U.S. GEOLOGICAL SURVEY
BROOKHURST, 1949-61, CASPER, 1951-61-(1971PR), CRIMSON DAWN, 1960, FREELAND, 1960, GOOSE EGG, 1950-61-(1971PR), OTTER CREEK, 1960

TRUE NORTH
MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:20,000

1 0 1 MILE
1000 0 1000 5000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

MAP OF THE PRECAMBRIAN GEOLOGY OF CASPER MOUNTAIN, NATRONA COUNTY

By
Dolores J. Gable and Arthur E. Burford

1982

22'30" 20' 17'30" 15' 12'30" 106°10'

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CONTOUR INTERVAL 20 FEET

DATUM IS MEAN SEA LEVEL

GEOLOGY MAPPED 1979-80

WYOMING

MAP LOCATION

MAP OF THE PRECAMBRIAN GEOLOGY OF CASPER MOUNTAIN, NATRONA COUNTY, WYOMING

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